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Utility of functioning measures in the prediction of independent living status in older adults with serious mental illness

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Abstract

Objective—The objective of the study was to compare the predictive utility of three commonly used functioning measures for people with serious mental illness in the prediction of independent living status.

Methods—We conducted a secondary data analysis from the Helping Older People Experience Success study with adults aged 50 years and older with a diagnosis of bipolar disorder, schizoaffective disorder, schizophrenia, or major depressive disorder ($N = 183$).

Results—Total scores for the Independent Living Skills Survey, Multnomah Community Ability Scale, and UCSD Performance-Based Skills Assessment were modestly inter-correlated. For the overall sample, greater independent living status at baseline and 1-year follow-up was predicted by higher baseline functioning scores on both the self-reported Independent Living Skills Survey and the UCSD Performance-Based Skills Assessment. However, by diagnostic subgroup, independent living status at 1-year follow-up was only predicted by the Independent Living Skills Survey for affective disorders and by the UCSD Performance-Based Skills Assessment for schizophrenia-spectrum disorders. For the total sample, the Independent Living Skills Survey was associated with self-efficacy and employment status. Neither the Independent Living Skills Survey nor UCSD Performance-Based Skills Assessment was associated with medical or psychiatric hospitalizations or with subjective physical or mental health status.

Conclusions—These commonly used functioning measures for people with serious mental illness examine different aspects of functioning. The choice of functional measurement should be based on the population under study and intervention goals.

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Conflict of interest
None declared.

Keywords

functioning; older adults; serious mental illness

Objective

Serious mental illnesses negatively impact individuals' ability to function independently in their homes and community (National Institutes of Health, 2007). Impaired functioning increases the likelihood of hospitalization and emergency room visits, and premature nursing home placement (Miller and Rosenheck, 2006; Bartels and Pratt, 2009). Despite consensus that functioning is a critical outcome in older adults (Jette, 2006; Bartels and Pratt, 2009), the predictive utility of functioning measures for real-world outcomes has not been well defined for older adults with serious mental illness. The goal of this report is to compare the predictive utility of three different measures of functioning in predicting living independently in the community for older adults with serious mental illness.

A core construct of functioning applied to older adults with serious mental illness includes "successful aging" incorporating prevention and maintenance of cognitive and physical functioning and full participation in activities (Bankole *et al.*, 2007; Cohen *et al.*, 2009). Living independently in the community is a robust indicator of functional ability and is widely recognized as common goal of successful aging. Independent living status is relevant as an indicator of functioning for individuals with serious mental illness across the age spectrum. Having a serious mental illness increases the likelihood of residing in an institution in middle-aged and older adults (Andrews *et al.*, 2009). For example, individuals with schizophrenia who are between the ages of 40 and 64 are 3.5 times more likely to reside in a nursing home compared with other Medicaid beneficiaries of the same age (Andrews *et al.*, 2009). Older adults with serious mental illness have two to three times greater healthcare costs compared with dually eligible (Medicaid and Medicare) beneficiaries without a mental health condition (Bartels *et al.*, 2003), largely due to the greater use of nursing home. Finally, the majority of older adults with serious mental illness prefer to live in community-based settings, and specifically prefer independent living settings over group homes (Browne and Courtney, 2004).

Valid measures of functioning are essential to developing and evaluating interventions aimed at increasing the likelihood of independent living in the community for older adults with serious mental illness. Instruments that measure functioning in people with serious mental illness employ a variety of constructs and different perspectives on functioning. Common approaches include data from the person (i.e., self-report), from informants (i.e., clinician rated), and simulated performances in clinical settings (Mausbach *et al.*, 2009). Although instruments that measure functioning in people with serious mental illness employ a variety of constructs and use different approaches, their utility to predict real-world outcomes has not been well defined for the heterogeneous group of older adults with serious mental illness.

The purpose of this report is to address the following:

1. To what degree do commonly used measures of functioning for serious mental illness correlate when applied to a subgroup of older adults?
2. What is the comparative predictive utility of different measures of functioning with respect to independent living status for older adults with serious mental illness?
3. Do different functioning measures vary in predictive utility when applied to schizophrenia-spectrum disorders compared with affective disorders?

Methods

We conducted a secondary analysis of baseline and 1-year data collected from the Helping Older People Experience Success (HOPES) study. The HOPES skills training intervention promotes social rehabilitation and integrated health care for adults age 50 and older with serious mental illness (Bartels *et al.*, 2004; Mueser *et al.*, 2010; Bartels *et al.*, 2014). The study consisted of a 12-month social skills training program. Study protocol was approved by Dartmouth College and the State of New Hampshire IRB.

Participants

This study included participants from three community mental health centers: one in Nashua, New Hampshire, and two in Boston, Massachusetts. Eligibility requirements included (i) aged 50 years or older; (ii) diagnosis of bipolar disorder, major depressive disorder, schizoaffective disorder, or schizophrenia based on the Structured Clinical Interview for DSM-IV (SCID) (First *et al.*, 1995); (iii) functional impairments defined by the state of New Hampshire criteria for Medicaid includes at least moderate impairment in two or more domains (i.e., activities of daily living, social, leisure, instrumental activities of daily living, and occupational); (iv) enrolled in the community mental health center research site for at least 3 months; and (v) fluency in English. Exclusion criteria included persons who (i) resided in a nursing home or an inpatient institution; (ii) had significant cognitive impairment (Mini-Mental State Examination (Folstein *et al.*, 1975) less than 20 or a diagnosis of dementia); (iii) had a terminal disease with a life expectancy of less than 12 months; and (iv) had substance dependence (substance use disorder module of the SCID). The final sample included 183 participants with a primary diagnosis of schizophrenia (n = 51), schizoaffective disorder (n = 52), major depressive disorder (n = 44), and bipolar disorder (n = 36).

Instruments

Three instruments were used to evaluate functioning: Independent Living Skills Survey (ILSS) (Wallace *et al.*, 2000), Multnomah Community Ability Scale (MCAS) (Barker *et al.*, 1994), and UCSD Performance-Based Skills Assessment (UPSA) (Patterson *et al.*, 2001). These instruments were selected based on published reports of their reliability and validity when applied to older adults with serious mental illness residing in the community.

The ILSS assesses 10 self-reported areas of functioning, operationalized as appearance and clothing, personal hygiene, care of personal possessions, food preparation/storage, health

maintenance, money management, transportation, leisure and community, job seeking, and job maintenance. The ILSS instrument has good validity and reliability with middle-aged and older adults with schizophrenia (age $M = 57.2$, SD = 7.2) (Perivoliotis *et al.*, 2004). The ILSS takes 20–30 min to administer. Scores range from 0 to 70, and higher scores indicate better functioning. We modified the ILSS to reduce the burden of administration on participants by eliminating nine questions that were judged to be of limited value from the appearance and clothing domain. Therefore, scores on the ILSS in this study ranged from 0 to 61.

The MCAS asks clinicians to evaluate the severity of an individual's level of functioning. The MCAS assesses four domains of functioning, operationalized as interference with functioning, adjustment to living, social competence, and behavioral problems. The MCAS has good validity and reliability with adults with bipolar disorder and schizophrenia (age $M = 43.5$) (Barker *et al.*, 1994). The MCAS takes 10–15 min to complete by a clinician. Scores on the MCAS range from 17 to 85, and higher scores indicate better functioning. For this study, the participant's case managers completed the MCAS.

The UPSA involves role play to assess functioning. The UPSA includes five domains of functioning operationalized as planning and organization, finances, communication, travel/transportation, and household maintenance. The UPSA has good validity and reliability with middle-aged and older adults with schizoaffective disorder and schizophrenia (age $M = 56$, SD = 8.5) (Patterson *et al.*, 2001). The UPSA takes 30 min to administer. Scores on the UPSA range from 0 to 100, and higher scores indicate better functioning. Trained raters administered the UPSA using a manualized assessment of simulated task performance.

Covariates included age, gender, psychiatric symptom, and medical severity. Psychiatric symptom severity was assessed with the Brief Psychiatric Rating Scale (BPRS) (Overall and Gorham, 1962). The BPRS consists of 24 psychiatric symptoms, and individuals rate each symptom on a seven-point scale. The BPRS includes five subscales: affect, anergia, thought disorder, activation, and disorganization. Higher scores indicate worse symptoms. Medical severity was determined using the Charlson comorbidity index (Charlson *et al.*, 1987), which quantifies medical severity and predicts 10-year mortality rates. To control for intervention effects in the longitudinal analysis, we included the HOPES intervention as a covariate.

Primary criterion of functioning

Our primary criterion of functioning consisted of independent living status at baseline and 1-year follow-up. Individuals residing in nursing homes were not eligible for participation in this study. For the purpose of this study, living status was classified as a binary variable. Living independently was defined as residing in a home or apartment without the need for or received professional in-home support services. In contrast, residing in supervised residential setting, group home, or assisted living facility was not considered to be living independently.

In addition, we evaluated the utility of functioning instruments in relation to five secondary functioning criterion: employment, medical hospitalization, psychiatric hospitalization, patient-reported health status, and self-efficacy. Hospitalization data from the past 12 months

from baseline were collected through chart review. Hospitalization for psychiatric reason or medical reason was considered separately. Employment was self-reported as either 1 = full-time/part-time/volunteer employment or 0 = unemployed. Patient-reported mental and physical health status was assessed using the SF-36 (Ware *et al.*, 1997). Higher scores indicate better perceived health status. The Revised Self-Efficacy Scale (McDermott, 1995) was used to assess self-efficacy. The Revised Self-Efficacy Scale includes 57 items to rate perceived self-efficacy as related to self-management of symptoms.

Statistical analyses

Covariates were selected for model adjustment based on prior research and using an empirical selection method. Potential covariates were added to logistic regressions between each functioning instrument and the functioning criteria. Covariates producing ≥10% change in the crude association between functioning instruments and functioning criterion were retained in logistic regression models for adjustment.

To simulate the instruments as they are used in the real world, we used the instruments' total scores. Therefore, a correlation matrix was used to examine association between the ILSS, MCAS, and UPSA total scores. We estimated pairwise correlations between each of the three functioning instruments with Bonferroni adjusted p values to account for multiple comparisons.

To examine associations between functioning instruments and functioning criterion, we fit a series of independent logistic regression equations for each functioning measure, with functioning criterion as binary dependent variables. For analysis, functioning instrument subscale scores were calculated by summing raw item scores and dividing by number of answered items. Scores were considered missing if more than 50% of subscale items were missing. Total scores were calculated by summing non-missing subscale scores. To produce comparable coefficient estimates, we transformed raw functioning measure total scores into z-scores ($M = 0$, SD = 1), so that logistic regression coefficients represented change in odds of functioning criterion for each standard deviation increase in functioning score. Logistic regressions were estimated overall and separately by psychiatric diagnosis.

To assess concurrent and predictive associations between functioning instruments and criterion of functioning, we fit separate logistic models considering criterion at both baseline and 1-year after functioning assessment. All statistical analyses were performed using STATA (version 14.1).

Results

Demographic characteristics of the study sample

Table 1 presents the sociodemographic characteristics of the sample at baseline. The sample of older adults ($M = 60.16 \pm 7.9$) was predominantly male (57.9%), non-White (85.8%), and married (64.5%), and half resided in an independent living setting (51.4%). Three-quarters were high school graduates (73.2%), and medical diagnoses included hypertension (45.2%), diabetes (28.3%), or chronic obstructive pulmonary disorder (23.7%). Significant differences were observed across diagnostics categories on age, gender, marital status, residential status,

hypothyroidism, the total score, and subscales (i.e., comprehension, communication, and shopping) on the UPSA, and the interference with functioning subscale on the MCAS.

Relationship between the ILSS, MCAS, and UPSA instruments

All three measures were modestly inter-correlated, with the greatest association between the ILSS (self-report) and UPSA (performance-based) measures. Total scores for the ILSS, MCAS, and UPSA showed small but significant correlations between each of the instruments (MCAS and ILSS total scores, $r = 0.32$, $p \leq 0.001$; MCAS and UPSA measures, $r = 0.22$, $p \leq 0.05$; ILSS and UPSA measures, $r = 0.41$, $p \leq 0.001$).

Predictive utility of the ILSS, MCAS, and UPSA instruments

Tables 2 and 3 show the relationship between the ILSS, MCAS, and UPSA and baseline and 1-year follow-up indicators of functioning variables. As shown, a higher level of functioning at baseline on the self-report measure of functioning (ILSS) was associated with a greater likelihood of living independently and being employed, as well as greater self-reported rating of self-efficacy. At 1 year, a higher level of functioning on the ILSS also predicted greater likelihood of self-efficacy and independent living status. At baseline and 1 year, a higher level of functioning on the performance measure of functioning (UPSA) predicted greater likelihood of living independently. In contrast, participants with a higher level of functioning on the observer rated measure of functioning (MCAS) were less likely to have a psychiatric hospital stay at baseline, but not at follow-up. Also, participants with a higher level of functioning on the MCAS were less likely to live independently at 1 year.

Diagnosis-specific concurrent and predictive utility

Table 4 stratifies participants by psychiatric diagnosis to examine the association of each of the three measures with independent living status separately for schizophrenia-spectrum disorders and for affective disorders. Participants with schizophrenia-spectrum disorder (i.e., schizophrenia and schizoaffective disorder) or affective disorders (i.e., bipolar disorder and major depressive disorder) who had a higher level of functioning on the UPSA had greater likelihood of living independently at baseline. At 1 year, the UPSA predicted independent living only among participants with schizophrenia-spectrum disorder. Also, at 1 year, for individuals with affective disorders, the ILSS predicted greater likelihood independent living. Among participants with schizophrenia-spectrum disorder, higher level of functioning on the MCAS was associated with lower odds of living independently at baseline and follow-up.

Table 5 stratifies participants by psychiatric diagnosis to examine the association of the three measures with self-efficacy and subjective physical and mental health status. Participants with schizophrenia-spectrum disorder who had a higher level of functioning on the ILSS had greater likelihood of self-efficacy at baseline. At 1 year, the MCAS predicted self-efficacy only among participants with schizophrenia-spectrum disorder.

Discussion

The purpose of this study was to compare the predictive utility of three commonly used functioning measures in the prediction of independent living status in older adults with serious mental illness. We found only modest correlations between the self-reported ILSS, the clinician-rated MCAS, and UPSA. The ILSS measure of functioning was significantly associated with living independently, self-efficacy, and employment when used with the heterogeneous group of older adults with serious mental illness. However, among older adults with schizophrenia-spectrum disorders, only the performance-based measure of functioning (UPSA) predicted living independently at 1-year follow-up. Neither the ILSS nor UPSA was associated with medical or psychiatric hospitalizations or with subjective physical or mental health status.

This analysis indicated that the MCAS, ILSS, and UPSA are not interchangeable measures of functioning. For example, the MCAS includes assessments of selected cognitive and physical functioning (e.g., physical health status and responses to stress), in contrast to the ILSS and UPSA that do not. The ILSS and MCAS include participation in activities such as selected activities of daily living (e.g., personal hygiene), whereas the UPSA exclusively examines instrumental activities (e.g., money management and communication skills). Both the ILSS and MCAS include items related to social activities (e.g., strength of social network, engagement in meaningful activities, and leisure/community engagement), while the UPSA does not. Finally, the ILSS and MCAS assess if a person reports that he or she engages in an activity in his or her daily life. In contrast, the UPSA measures if a person can demonstrate the ability to complete a simulated activity. Thus, the process of selecting an appropriate measure may benefit from considering factors such as intervention goals and diagnostic characteristics of the sample (see Table 3 and 4).

Interestingly, the ILSS measures if a patient has performed a task; it does not measure a patient's actual ability to complete a task. In fact, the ILSS in this study and early studies found minimal correlation with actual performance. Research has consistently indicated only a small correlation between self-reported ability and actual ability to perform (Keefe *et al.*, 2006; Harvey *et al.*, 2013). Given the variability of associations among measures, the choice of functioning measure should be based on sample demographics.

Greater scores on the UPSA scale predicted greater likelihood of concurrent and 1-year residential independence among older adults with schizophrenia-spectrum disorders, but not among those with bipolar disorder. This finding is consistent with the development of the UPSA scale, which was designed and psychometrically tested among middle-aged and older adults with schizophrenia-spectrum disorders (Patterson *et al.*, 2001). Interestingly, previous studies found that a brief version of the UPSA (UPSA-B) was correlated with residential independence among individuals with schizophrenia and bipolar disorder aged 16 and older (Bowie *et al.*, 2010; Mausbach *et al.*, 2010) and with employment status (Mausbach *et al.*, 2011). Furthermore, previous studies have shown that the relationship between UPSA-B and functional independence was moderated by self-efficacy (Cardenas *et al.*, 2013), a finding we were not able to evaluate owing to our small sample. Differences in domains on the UPSA and the UPSA-B may explain inconsistencies between our findings and previous

studies. For example, the UPSA-B includes only two domains of functioning, communication and finance, whereas the full version UPSA used in the current study includes an additional three domains—planning and organization, travel/transportation, and household maintenance. These additional domains may be important in evaluating the likelihood of functional independence among different serious mental illness diagnoses and among different age groups. Future studies identifying mechanisms by which higher functioning predicts residential independence among different samples are warranted.

The ILSS (designed and psychometrically tested with middle-aged and older adults with schizophrenia-spectrum disorders) (Perivoliotis *et al.*, 2004) was not associated with independent living status among older adults with schizophrenia-spectrum disorders in our study at either points in time. As such, the ILSS is of uncertain utility in older adults with schizophrenia and may reflect a tendency to overestimate functional abilities on self-report measures (Burdick *et al.*, 2005; Gould *et al.*, 2013). Our findings are consistent with earlier studies that found minimal correlation with actual performance (Keefe *et al.*, 2006; Harvey *et al.*, 2013). Given this potential limitation of self-report, the choice of functioning measure should be based on potential diagnosis and ability to accurately report personal functioning.

Surprisingly, higher functioning on the MCAS predicted lower likelihood of independent living at 1 year. The MCAS may be susceptible to confirmation bias. For example, participants with a higher level of functioning on the MCAS were less likely to have a psychiatric hospital stay at baseline but not at follow-up. This suggests that case managers may not be aware of additional supports provided to consumers such as home-based assistance. Consequently, they may unknowingly respond to such items positively even though consumers are receiving help and cannot complete tasks independently.

None of the instruments predicted patient-reported physical and mental health status. Patient-reported health outcomes were once considered biased and unsubstantiated evidence of the quality of an intervention. Patient-reported outcomes are now considered a critical component to assess the quality of health care (Burwell, 2015). As these instruments did not respond to physical and mental health status, this may be because of differences between health and functioning constructs.

This study has a number of important limitations to consider. First, this was a secondary data analysis, and we were limited by the original variables. For example, our measure of independent living status was based on whether or not participants resided in professionally supervised or assisted long-term care settings or received professional in-home support services. We did not measure the extent to which participants received informal, functional supports within the home by a spouse or other family member or from other unpaid sources. Second, we modified the ILSS to reduce the burden of administration on participants by eliminating nine questions that were judged to be of limited value from a domain on maintaining appearance and clothing. Therefore, scores on the ILSS in this study ranged from 0 to 61 (rather than 0–70). Third, the sample size within each diagnostic group was small and may have limited our analysis to find differences between the groups and our ability to evaluate interactions between for instance self-efficacy and functioning.

Despite these limitations, this study contributes to a limited research literature on the predictive utility of different approaches to measuring functioning in a rapidly growing population of community-residing older adults with serious mental illness. We found that the ILSS (self-report), MCAS (clinician rated), and UPSA (simulated performance) were all modestly correlated with each other, but measured somewhat different constructs of functioning. Valid assessment of independent functioning in middle-aged and older adults with serious mental illness may be conducted with the ILSS for heterogeneous group of older adults with serious mental illness, whereas the UPSA performance-based measure is optimal for older adults with schizophrenia-spectrum disorders. Future approaches to assessment may include new technologies that evaluate functioning using electronically simulated and virtual approaches (Ruse *et al.*, 2014) with the potential to overcome the practical demands of clinically administered measures.

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Key points

- The purpose of this study was to compare the predictive utility of three commonly used functioning measures in the prediction of independent living status in older adults with serious mental illness.
- The Independent Living Skills Survey measure of functioning was significantly associated with living independently, self-efficacy, and employment when used with the heterogeneous group of older adults with serious mental illness.
- However, among older adults with schizophrenia-spectrum disorders, only the performance-based measure of functioning (Performance-Based Skills Assessment) predicted living independently at 1-year follow-up.

Table 1

Sample characteristics at baseline

	Total (*n* = 183)	Schizophrenia (*n* = 51)	Schizoaffective disorder (*n* = 52)	Major depressive disorder (*n* = 44)	Bipolar disorder (*n* = 36)	*p* value
Age (*M* ± SD)	60.166 (7.9)	60.769 (8.0)	56.892 (5.9)	61.774 (9.3)	62.073 (7.5)	0.021
Gender						
Female	77 (42.1)	32 (62.8)	24 (46.2)	11 (25.0)	10 (27.8)	0.001
Male	106 (57.9)	19 (37.3)	28 (53.9)	33(75.0)	26 (72.2)	
Ethnicity						
White	26 (14.2)	8 (15.7)	10 (19.2)	4 (9.1)	4 (11.1)	0.533
Non-White	157 (85.8)	43 (84.3)	42 (80.8)	40 (90.9)	32 (88.9)	
Hispanic						
No	171 (93.4)	48 (94.1)	47 (90.4)	40 (90.9)	36 (100.0)	0.226
Yes	12 (6.6)	3 (5.9)	5 (9.6)	4 (9.1)	0 (0.0)	
Marital status						
Never married	65 (35.5)	29 (56.9)	25 (48.1)	6 (13.6)	5 (13.9)	<0.001
Married	118 (64.5)	22 (43.1)	27 (51.9)	38 (86.4)	31 (86.1)	
Acute services utilization						
Days in hospital for medical condition (*M* ± SD)	4.09 (22.6)	1.97 (5.0)	1.93 (5.7)	9.33 (43.0)	2.89 (5.8)	0.413
Days in hospital for psychiatric condition (*M* ± SD)	4.80 (15.3)	1.85 (5.7)	3.73 (8.18)	5.41 (15.6)	9.64 (27.1)	0.211
Overnight stays in hospital for medical condition (*M* ± SD)	0.29 (0.5)	0.26 (0.4)	0.27 (0.4)	0.36 (0.5)	0.29 (0.5)	0.759
Overnight stays in hospital for psychiatric condition (*M* ± SD)	0.21 (0.4)	0.13 (0.3)	0.29 (0.5)	0.21 (0.4)	0.21 (0.4)	0.359
Education						
High school graduate	134 (73.2)	38 (74.5)	41 (78.9)	29 (65.9)	26 (72.2)	0.561
Less than high school	49 (26.8)	13 (25.5)	11 (21.2)	15 (34.1)	10 (27.8)	
Employment						
Yes	36 (19.8)	14 (27.5)	11 (21.2)	5 (11.6)	6 (16.7)	0.056
No	146 (80.2)	37 (72.6)	41 (78.9)	38 (88.4)	30 (83.3)	
Living status						
Living independently	94 (51.4)	14 (27.5)	26 (50.0)	31 (70.5)	23 (63.9)	<0.001
Supervised/supported housing	89 (48.6)	37 (72.6)	26 (50.0)	13 (29.6)	13 (36.1)	

	Total (*n* = 183)	Schizophrenia (*n* = 51)	Schizoaffective disorder (*n* = 52)	Major depressive disorder (*n* = 44)	Bipolar disorder (*n* = 36)	*p* value
Medical diagnosis						
Hypertension	80 (45.2)	21 (42.9)	24 (48.0)	23 (53.5)	12 (34.3)	0.372
Diabetes	50 (28.3)	19 (38.8)	15 (30.0)	10 (23.3)	6 (17.1)	0.152
COPD	42 (23.7)	10(20.4)	9 (18.0)	10 (23.3)	13 (37.1)	0.217
Hypothyroidism	32 (18.1)	4 (8.2)	11 (22.0)	6 (14.0)	11 (31.4)	0.038
Asthma	25 (14.1)	7 (14.3)	5 (10.0)	7 (16.3)	6 (17.1)	0.754
Cardiac disease	23 (13.0)	6 (12.2)	6 (12.0)	6 (14.0)	5 (14.3)	0.99
Psychiatric Symptom Severity						
BPRS (*M* ± SD)	54.89 (13.3)	56.82 (14.1)	57.54 (15.04)	52.68 (10.68)	51.03 (11.4)	0.063
Medical severity						
Charlson comorbidity index (*M* ± SD)	2.66 (2.3)	2.18 (2.3)	2.65 (2.6)	3.30 (2.4)	2.57 (1.9)	0.144
ILSS total score	38.6 (6.4)	36.9 (6.8)	39.5 (6.5)	39.0 (6.3)	39.0 (5.2)	0.161
UPSA total score	70.6 (17.7)	61.8 (19.4)	72.3 (15.0)	74.9 (15.9)	75.8 (16.7)	<0.001
MCAS total score	60.4 (9.6)	61.6 (9.7)	62.0 (7.5)	57.1 (9.9)	60.4 (11.4)	0.060

Notes. BPRS, Brief Psychiatric Rating Scale; COPD, chronic obstructive pulmonary disease; ILSS, Independent Living Skills Survey; MCAS, Multnomah Community Ability Scale; UPSA, UCSD Performance-Based Skills Assessment.

Table 2

Logistic regression models of total scores on criterion outcomes of functioning

	Self-report (ILSS)AOR (95% CI)	Clinician rated (MCAS)AOR (95% CI)	Performance based (UPSA)AOR (95% CI)
Living independently (Y/N)			
Baseline	1.44* (1.01–2.02)	0.71 (0.49–1.03)	1.77* (1.18–2.64)
At 12-month follow-up	1.55* (1.07–2.25)	0.54* (0.35–0.82)	1.67* (1.08–2.59)
Employed (Y/N)			
Baseline	1.76* (1.10–2.83)	1.23 (0.79–1.89)	1.26 (0.77–2.05)
Psychiatric hospitalization (Y/N)			
Prior 12 months	1.18 (0.76–1.83)	0.69* (0.49–1.01)	1.16 (0.73–1.86)
At 12-month follow-up	1.26 (0.79–2.02)	1.14 (0.73–2.02)	70 (0.42–1.15)
Medical hospitalization (Y/N)			
Prior 12 months	1.36 (0.91–2.04)	1.29 (0.84–1.96)	1.15 (0.76–1.72)
At 12-month follow-up	0.72 (0.47–1.10)	1.06 (0.71–1.58)	1.05 (0.68–1.63)

Notes. Models adjusted for age, gender, psychiatric symptom severity (Brief Psychiatric Rating Scale), medical severity (Charlson comorbidity index), and intervention group.

AOR, adjusted odds ratio; CI, confidence interval; ILSS, Independent Living Skills Survey (self-report); MCAS, Multnomah Community Ability Scale (clinician-rated); UPSA, UCSD Performance-Based Skills Assessment (performance-based ratings of simulated community living skills).

* p value < 0.05.

Table 3

Linear regression models of total scores on criterion outcomes of functioning

	Self-report (ILSS) β (95% CI)	Clinician rated (MCAS) β (95% CI)	Performance based (UPSA) β (95% CI)
Patient-reported mental health (SF-36 MCS)			
Baseline	1.21 (−1.64 to 1.88)	−0.47 (−2.09 to 1.15)	−0.12 (−1.80 to 1.55)
At 12-month follow-up	−0.24 (−2.14 to 1.66)	0.81 (−1.19 to 2.82)	−1.44 (−3.50 to 0.61)
Patient-reported physical health (SF-36 PCS)			
Baseline	−0.08 (−1.66 to 1.49)	−0.2 (−2.02 to 1.62)	−1.97 (−3.83 to 0.13)
At 12-month follow-up	0.88 (−0.84 to 2.60)	0.42 (−1.39 to 2.23)	−0.53 (−2.39 to 1.34)
Self-efficacy (RSES)			
Baseline	4.53 * (1.75 to 7.31)	−1.16 (−4.08 to 1.76)	−0.94 (−3.98 to 2.10)
At 12-month follow-up	3.69 * (0.84–6.55)	1.69 (−1.32 to 4.70)	0.02 (−3.16 to 3.20)

Notes. Models adjusted for age, gender, psychiatric symptom severity (Brief Psychiatric Rating Scale), medical severity (Charlson comorbidity index), and intervention group.

AOR, adjusted odds ratio; ILSS, Independent Living Skills Survey (self-report); MCAS, Multnomah Community Ability Scale (clinician-rated); RSES, Revised Self-Efficacy Scale; UPSA, UCSD Performance-Based Skills Assessment (performance-based ratings of simulated community living skills).

* p value < 0.05.

Table 4

Logistic regression models of total scores on living status by psychiatric diagnosis

	Self-report (ILSS)AOR (95% CI)	Clinician rated (MCAS)AOR (95% CI)	Performance based (UPSA)AOR (95% CI)
Schizophrenia-spectrum disorders, *N* = 103			
Living independently (Y/N)			
Baseline	1.32 (0.84–2.08)	0.52 * (0.30–0.91)	2.32 * (1.25–4.32)
At 12-month follow-up	1.35 (0.84–2.17)	0.54 * (0.29–1.00)	2.64 * (1.27–5.47)
Affective disorders, *N* = 80			
Living independently (Y/N)			
Baseline	1.47 (0.79–2.73)	0.96 (0.58–1.58)	1.76 * (1.00–3.11)
At 12-month follow-up	2.14 * (1.08–4.23)	0.58 (0.32–1.04)	1.3 (0.73–2.31)

Notes. Models adjusted for age, gender, psychiatric symptom severity (Brief Psychiatric Rating Scale), medical severity (Charlson comorbidity index), and intervention group.

AOR, adjusted odds ratio; CI, confidence interval; ILSS, Independent Living Skills Survey (self-report); MCAS, Multnomah Community Ability Scale (clinician rated); UPSA, UCSD Performance-Based Skills Assessment (performance-based ratings of simulated community living skills).

* *p* value < 0.05.

Table 5

Linear regression models of total scores on self-efficacy and patient-reported physical health outcomes by psychiatric diagnosis

	Self-report (ILSS) β (95% CI)	Clinician rated (MCAS) β (95% CI)	Performance based (UPSA) β (95% CI)
Self-efficacy (RSES)			
Schizophrenia-spectrum disorders, *N* = 103			
Baseline	3.75 * (−0.08 to 7.59)	0.8 (−3.81 to 5.42)	−1.69 (−6.27 to 2.88)
At 12-month follow-up	3.21 (−0.449 to 6.88)	4.88 * (0.28–9.47)	−0.13 (−4.62 to 4.37)
Affective disorders, *N* = 80			
Baseline	3.66 (−0.811 to 8.13)	−2.24 (−6.04 to 1.55)	0.39 (−3.75 to 4.54)
At 12-month follow-up	2.93 (−2.11 to 7.99)	−0.97 (−5.05 to 3.11)	0.22 (−4.57 to 5.01)
Patient-reported physical health outcomes (SF-36 PCS)			
Schizophrenia-spectrum disorders, *N* = 103			
Baseline	0.28 (−1.80 to 2.36)	−0.86 (−3.36 to 1.63)	−1.25 (−3.68 to 1.17)
At 12-month follow-up	1.97 (−0.33 to 4.28)	1.78 (−1.16 to 4.72)	−2.3 (−5.06 to 0.464)
Affective disorders, *N* = 80			
Baseline	0.01 (−2.67 to 2.68)	−0.04 (−2.25 to 2.18)	0.68 (−1.75 to 3.12)
At 12-month follow-up	−1.37 (−4.17 to 1.42)	−0.38 (−2.77 to 2.01)	0.81 (−1.80 to 3.43)

Notes. Models adjusted for age, gender, psychiatric symptom severity (Brief Psychiatric Rating Scale), medical severity (Charlson comorbidity index), and intervention group.

CI, confidence interval; ILSS, Independent Living Skills Survey (self-report); MCAS, Multnomah Community Ability Scale (clinician-rated); RSES, Revised Self-Efficacy Scale; UPSA, UCSD Performance-Based Skills Assessment (performance-based ratings of simulated community living skills).

* *p* value < 0.05.